

Amendment to the Claims:

1. (Original) A magnetic nanoparticle having a core of metal atoms, wherein the core is covalently linked to a plurality of ligands and has a diameter of less than 2.5nm.
2. (Original) The magnetic nanoparticle of claim 1, wherein the core comprises passive metal atoms and magnetic metal atoms.
3. (Original) The magnetic nanoparticle of claim 1, wherein the core comprises passive metal atoms.
4. (Currently amended) The magnetic nanoparticle of claim 2 ~~or claim 3~~, wherein the passive metal is gold, platinum, silver or copper and the optional magnetic metal is iron, cobalt or gadolinium.
5. (Currently amended) The magnetic nanoparticle of ~~any one of the preceding claims~~claim 1, wherein the core is formed from atoms of Au, Au/Fe, Au/Cu, Au/Gd, Au/Fe/Cu, Au/Fe/Gd or Au/Fe/Cu/Gd.
6. (Currently amended) The magnetic nanoparticle of ~~any one of claims 2 to 5~~claim 2, wherein the ratio of passive metal atoms to magnetic metal atoms in the core is between about 5:0 and about 2:5
7. (Currently amended) The magnetic nanoparticle of ~~any one of claims 2, 4 or 5~~claim 2, wherein the ratio of passive metal atoms to magnetic metal atoms in the core is between about 5:0.1 and about 5:1.
8. (Currently amended) The magnetic nanoparticle of ~~any one~~

~~of claims 2, 4, 5 or 7~~claim 2, wherein the passive metal is gold and the magnetic metal is iron.

9. (Original) The magnetic nanoparticle of claim 8, wherein the ratio of gold atoms to iron atoms is about 5:0.1.

10. (Original) The magnetic nanoparticle of claim 8, wherein the ratio of gold atoms to iron atoms is about 5:1.

11. (Currently amended) The magnetic nanoparticle of ~~any one of claims 1, 2 4 or 5~~claim 1, wherein the core has a diameter of less than 2.0 nm when the core contains only passive metal atoms such as Au.

12. (Currently amended) The magnetic nanoparticle of ~~any one of the preceding claims~~claim 1, wherein ~~the ligand incorporates~~said ligands incorporate a lanthanide.

13. (Original) The magnetic nanoparticle of claim 12, wherein the lanthanide is gadolinium.

14. (Currently amended) The magnetic nanoparticle of ~~any one of the preceding claims~~claim 1, wherein the nanoparticle comprises an NMR active atom.

15. (Original) The magnetic nanoparticle of claim 14, wherein the NMR active atom is Mn^{+2} , Gd^{+3} , Eu^{+2} , Cu^{+2} , V^{+2} , Co^{+2} , Ni^{+2} , Fe^{+2} , Fe^{+3} or a lanthanide⁺³.

16. (Currently amended) The nanoparticle of ~~any one of the preceding claims~~claim 1, wherein the ligand comprises a carbohydrate group.

17. (Currently amended) The nanoparticle of ~~any one of the preceding claims~~claim 1, wherein ~~the ligand comprises~~said

ligands comprise a polysaccharide, an oligosaccharide or a monosaccharide group.

18. (Currently amended) The nanoparticle of ~~any one of the preceding claims~~claim 1, wherein ~~the ligand comprises~~said ligands comprise a glycanoconjugate.

19. (Original) The nanoparticle of claim 18, wherein the glycanoconjugate is a glycolipid or a glycoprotein.

20. (Currently amended) The nanoparticle of ~~any one of the preceding claims~~claim 1, wherein ~~the ligand is~~said ligands are linked to the core via a sulphide group.

21. (Currently amended) The nanoparticle of ~~any one of the preceding claims~~claim 1, wherein the nanoparticle comprises a label.

22. (Original) The nanoparticle of claim 21, wherein the label is a fluorescent group or a radioactive isotope or a NMR active atom.

23. (Currently amended) The nanoparticle of ~~any one of the preceding claims~~claim 1, wherein the nanoparticle comprises a peptide.

24. (Currently amended) The nanoparticle of ~~any one of the preceding claims~~claim 1, wherein the nanoparticle comprises DNA or RNA.

25. (Currently amended) The nanoparticle of ~~any one of the preceding claims~~claim 1, wherein the nanoparticle comprises a pharmaceutically active component.

26. (Currently amended) The nanoparticle of ~~any one of the~~

~~preceding claims~~claim 1, wherein the ligand is capable of binding a receptor on a cell.

27. (Currently amended) The nanoparticle of ~~any one of the preceding claims~~claim 1, wherein the nanoparticle is water soluble.

28. (Currently amended) A composition comprising a population of at least one ~~or more of~~ the nanoparticles of ~~any one of claims 1 to 27~~claim 1.

29. (Original) The composition of claim 28 which comprises a plurality of nanoparticles having different ligand groups.

30. (Canceled)

31. (Currently amended) The composition of ~~any one of claims 28 to 30, which composition is~~claim 28 in the form of a colloid.

32. (Currently amended) The ~~colloid~~composition of claim 31, wherein the nanoparticles of said colloid have a mean diameter of less than 2nm.

33. (Currently amended) The ~~colloid of~~composition of claim 31 ~~or claim 32, which~~said colloid ~~is~~being stable for at least about 1 year.

34.-51. (Canceled)

52. (Currently amended) A method of preparing nanoparticles according to ~~any one of claims 1 to 26~~claim 1, wherein the nanoparticles comprise a core comprising gold atoms and optionally iron atoms, ~~which~~said core ~~is~~being covalently linked to a plurality of ligands, the method comprising:

(a) synthesizing a sulphide derivative of the ligand; and
(b) reacting the sulphide derivatised ligand with HAuCl_4 (tetrachloroauric acid), and optionally with a ferric salt where iron atoms are present in the core, in the presence of reducing agent to produce the particles.

53. (Original) The method of claim 52, wherein step (b) comprises derivatising the ligand with a linker.

54. (Original) The method of claim 53, wherein the the linker is a disulphide linker.

55. (Original) The method of claim 54, wherein the disulphide linker group is represented by the general formula $\text{HO}-(\text{CH}_2)_n-\text{S}-\text{S}-(\text{CH}_2)_m-\text{OH}$, wherein n and m are independently integers between 1 and 5.

56. (Original) The method of claim 55, wherein the ligand is derivatised as a protected disulphide.

57. (Currently amended) The method of ~~any one of claims 52 to 56~~claim 52, wherein the ligand comprises a carbohydrate group.

58. (Currently amended) A nanoparticle ~~as obtainable~~produced by the method of ~~any of claims 52 to 57~~claim 52.

59. (Currently amended) A method of disrupting an interaction between a carbohydrate and a binding partner, the method comprising contacting the carbohydrate and the binding partner with nanoparticles according to ~~any one of claims 1 to 27~~claim 1, wherein the ligands bound to the nanoparticles comprise a carbohydrate group capable of disrupting the interaction of the carbohydrate and the binding partner.

60. (Currently amended) A method of screening for substances

capable of binding to a ligand, the method comprising (a) contacting the nanoparticles of ~~any one of claims 1 to 27~~claim 1 with one or more candidate compounds and (b) determining whether the candidate compounds binds to the ligand.

61. (Currently amended) A method of determining the presence in a sample of a substance capable of binding to a ligand, the method comprising (a) contacting the sample with the nanoparticles of ~~any one of claims 1 to 27~~claim 1 so that the substance binds to the ligand of the nanoparticles and (b) determining whether binding takes place.

62. (Currently amended) The method of claim 61, further comprising the step of correlating the presence or absence of binding with the diagnosis of a disease state associated with the presence of the substance.

63. (Currently amended) The method of claim 61 ~~or claim 62~~, wherein the substance is an antibody which is capable of binding to the ligand.

64. (Currently amended) A method of determining whether a carbohydrate mediated interaction occurs, the method comprising (a) contacting one or more species suspected to interact via a carbohydrate mediated interaction with the nanoparticles of ~~any one of claims 1 to 27~~claim 1 and (b) determining whether the nanoparticles modulate the carbohydrate mediated interaction.

65. (Currently amended) The method of ~~any one of claims 59 to 64~~claim 59, wherein the nanoparticles are detected by nuclear magnetic resonance (NMR), aggregation, transmission electron microscopy (TEM), atomic force microscopy (AFM), surface plasmon resonance (SPR), or with nanoparticles comprising silver atoms, signal amplification using the nanoparticle-

promoted reduction of silver (I).

66. (New) A method for vaccination of a patient with an antigen, said method comprising administering to said patient a vaccine comprising nanoparticles according to claim 1, wherein the ligands linked to the core of the nanoparticle comprise said antigen.

67. (New) The vaccination according to claim 66, wherein the vaccine is administered by application of a magnetic field.

68. (New) A method for vaccination of a patient with a nucleic acid encoding an antigen, said method comprising administering to said patient a vaccine comprising nanoparticle according to claim 1, wherein the ligand linked to the core of the nanoparticle comprise said nucleic acid.

69. (New) The vaccination method according to claim 68, wherein the vaccine is administered by application of a magnetic field.

70. (New) A method for performing magnetic resonance imaging (MRI) of a site in a patient, said method comprising administering to said patient a MRI contrast agent comprising nanoparticles according to claim 1.

71. (New) The method of claim 70, wherein the imaged site comprises the lungs of said patient.

72. (New) The method of claim 70, wherein the nanoparticles comprise gadolinium and have a core diameter of less than 1.0nm.

73. (New) A method for treating cancer in a patient, said method comprising administering to said patient a medicament

comprising nanoparticles according to claim 1.

74. (New) The method of claim 73, wherein said cancer is a tumor.

75. (New) The method of claim 73, wherein said tumor is exposed to a high frequency magnetic field or said tumor is exposed to infrared light.

76. (New) The method of claim 73, wherein said nanoparticles comprise a ligand which is a tumor-associated antigen or tumor autocrine factor.

77. (New) The method of claim 76, wherein said ligand is a carbohydrate.

78. (New) A method for inhibiting tumor metastasis in a patient, said method comprising administering to said patient a medicament comprising nanoparticles according to claim 1.

79. (New) The method of claim 78, wherein the ligands comprise a carbohydrate with specificity or affinity for metastasis, a hormone, or DHEA, a peptide capable of binding to a cell-specific receptor, a lipid for binding a toll receptor, methylene blue for binding to metastatising melanoma cells.

80. (New) A method of performing myocardial salvage on a patient, said method comprising administering to said patient a medicament comprising nanoparticles according to claim 1.